## What is claimed is:

1. A method for manufacturing thin-film electrochemical devices comprising the steps of

forming an anode layer;

applying an electrolyte layer to one face of said anode layer, and around said anode layer's edges;

applying a cathode layer to a portion of the exposed face of said electrolyte layer, leaving a gap extending from the edge of said face radially inward;

applying an interconnect layer to said anode layer, covering the entire exposed surface of said anode layer; and

applying an interconnect layer to said cathode layer, and to the remaining exposed electrolyte layer, covering the exposed surface of the electrolyte layer.

- 2. The method of claim 1 wherein said anode layer comprises a Ni/yttria stabilized zirconia cermet.
- 3. The method of claim 1 wherein said electrolyte layer comprises a material selected from a group comprising: yttria stabilized zirconia, a mixed ion and electron conductor, and a composite of a metal and an ion conductor.
- 4. The method of claim 1 wherein said cathode layer comprises a composite of strontium-doped lanthanum manganite.
- 5. The method of claim 1 wherein said cathode layer comprises yttria stabilized zirconia.
- The method of claim 1 wherein said interconnect layer comprises a material selected from a group comprising: metal, alloy, and ceramic.
- 7. The method of claim 1 wherein said forming an anode layer comprises tape casting.
- 8. The method of claim 1 wherein said applying an electrolyte layer comprises a thinfilm deposition technique.
- 9. The method of claim 8 wherein said thin-film deposition technique comprises a technique selected from a group comprising: aqueous spray deposition, tape casting, cocasting onto said anode layer, thermal spray, plasma spray, and directed vapor deposition.
- 10. The method of claim 1 wherein said applying a cathode layer comprises a thin-film deposition technique.
- 11. The method of claim 10 wherein said thin-film deposition technique comprises screen printing.

- 12. The method of claim 1 wherein said applying an interconnect layer comprises a thinfilm deposition technique.
- The method of claim 12 wherein said thin-film deposition technique comprises a technique selected from a group comprising: thermal spray, directed vapor deposition, plasma spray, tape-casting, and co-casting onto a porous catalyst layer.
- 14. The method of claim 1 wherein said applying an interconnect layer comprises applying over a removable core.
- 15. The method of claim 1 wherein said applying an interconnect layer comprises applying over a shaped form.
- 16. The method of claim 1 wherein said applying an interconnect layer comprises a ceramic-to-metal joining technique.
- The method of claim 16 wherein said ceramic-to-metal joining technique comprises a technique selected from a group comprising: transient liquid phase bonding and brazing.
- 18. The method of claim 1 further comprising applying a buffer layer between a pair of layers.
- 19. The method of claim 18 wherein said buffer layer is applied between an interconnect layer and another layer.
- 20. The method of claim 1 wherein said anode and said cathode layer comprise porous catalyst layers.
- The method of claim 21 wherein said porous catalyst layers comprise a material selected from a group comprising: a mixed ion and electron conducting ceramic and a composite of metal and an ion conducting ceramic.
- 22. The method of claim 20 wherein said porous catalyst layers are formed by a thin-film deposition technique.
- The method of claim 22 wherein said thin-film deposition technique comprises a technique selected from a group comprising: tape-casting, screen printing, thermal spray, and plasma spray.
- 24. An apparatus for use as a thin-film electrochemical device comprising

an anode layer;

an electrolyte layer on said anode layer;

a cathode layer on said electrolyte layer;

- a first interconnect layer on said anode layer; and
- a second interconnect layer on said cathode layer.

- 25. The apparatus of claim 24 wherein said anode layer comprises a Ni/yttria stabilized zirconia cermet.
- 26. The apparatus of claim 24 wherein said electrolyte layer comprises yttria stabilized zirconia.
- 7 27. The apparatus of claim 24 wherein said cathode layer comprises a composite of strontium-doped lanthanum manganite and yttria stabilized zirconia.
  - 28. The apparatus of claim 24 wherein an interconnect layer is metallic.
  - 29. The apparatus of claim 24 further comprising a buffer layer between a pair of said layers.
  - 30. An apparatus comprising a plurality of thin-film electrochemical devices of the apparatus of claim 24 bonded together.
- The apparatus of claim 30 wherein said bonding comprises transient liquid phase bonding.
- The apparatus of claim 30 wherein said bonding comprises brazing.
- The apparatus of claim 24 wherein said anode and said cathode layers comprise porous catalyst layers
  - 34. The apparatus of claim 33 wherein said porous catalyst layers comprise a mixed ion and electron conducting ceramic.
  - 35. The apparatus of claim 33 wherein said porous catalyst layers comprise a composite of a metal and an ion conducting ceramic.
  - 36. The apparatus of claim 24 wherein said electrolyte layer comprises a mixed ion and electron conductor.
  - 37. The apparatus of claim 24 wherein said electrolyte layer comprises a composite of a metal and an ion conductor.
- 38. The apparatus of claim 24 wherein said interconnect layers comprise ceramic.
- Q 39. The apparatus of claim 30 wherein said plurality of thin-film electrochemical devices are bonded together by a technique comprising ceramic-ceramic bonding.
  - 40. A method of manufacturing stacks of thin-film electrochemical devices comprising the step of connecting a plurality of apparatus of claim 24.
  - The method of claim 40 wherein said connecting comprises a technique selected from a group comprising: ceramic-ceramic bonding, transient liquid phase bonding, and brazing.